

prove the average luminance. series, in a comparatively easy structure, in order to imtroluminescence element to which a diode is connected in vice capable of providing refresh action to an organic elec-(57) Abstract: A light emitting circuit and a display de-

[Continued on next page]

(24) JUFF: FIGHJE ENILLING CIRCUIT FOR ORGANIC ELECTROLUMINESCENCE ELEMENT AND DISPLAY DEVICE

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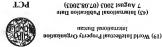
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DESCRIPTION

FIGHT EMITTING CIRCUIT FOR ORGANIC ELECTROLUMINESCENCE

ELEMENT AND DISPLAY DEVICE

Technical Field

The present invention relates to a light emitting circuit

tor an organic electroluminescence element and a display

device.

Background Art

torming a light emitting layer. As a result, the EL element zige of the diode component E) to an organic functional layer ejectric current starts flowing from the electrode (the anode emraston furespold voltage peculiar to the KL element, scross the electrodes exceeds the barrier voltage or the light accumulated in the capacity component C. When the voltage the electrodes of the EL element, electric charge is When a light emitting driving DC voltage is applied between can be considered to be a capacitive light emitting element. parallel to the capacity component. Therefore, an EL element and a component E having a diode characteristic coupled in can be substituted by a constitution of a capacity component C abown in Fig. 1. As can be understood from Fig. 1, an element can be electrically expressed as an equivalent circuit, as ss ,Er element,)' which is a cabacitive light emitting element, An electroluminescence element (hereinafter referred to

characteristic of a diode in that the current I is very small the EL element 1s, as shown in Fig. 2, similar to the

The voltage V- current I- luminance L characteristic of ewits light at light intensity proportional to the current.

at a voltage lower than the light emission threshold voltage by and increases at a voltage higher than the light emission threshold voltage Wth. Further, the current I and the Light emission luminance be are nearly proportional to each other. The EL element shows light emitting luminance with a decordance with a driving voltage W when the driving voltage applied to the EL element exceeds the light emission threshold voltage Wth. and shows no light emitting luminance when the driving voltage V applied to the emitting luminance when the driving voltage V applied to the EL element is equal to or lower than the light emission

When a voltage is applied to the EL element of which the function has deteriorated for repeated light emission, in a direction contrary to the forward direction, namely, a reverse bias voltage is applied, it is known that there is refresh scrion such that the function of the EL element is recovered. As it also such that the function of the EL element is recovered.

turespord voltage vtb.

making an EL element emit 11ght, when a driving current is supplied to the EL element through a diode which is connected to the EL element in sexies, the EL element emits light, and then maintains the light emission by electric charge, which is accumulated in the capacitive component of the EL element in scoordance with the driving current, for a while even after stopping the supply of the driving current. This phenomenon is can be effectively used in improving the average luminance of the EL element when a scanning current.

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metrix shape, especially a display panel having a large number qisbjek bener with a plurality of EL elements arranged in a

of lines.

to sn EL element in series, however, it is difficult to form a In a light emitting circuit in which a diode is connected

Disclosure of Invention element to provide the refresh action. structure for applying a reserve bias voltage to the EL

luminance, in a comparatively easy structure. groge te connected in series so se to improve the average capable of providing refresh action to the EL element where a emitting circuit for an EL element and a display device

According to the present invention, there is provided a

yu oplect ot the present invention is to provide a light

corrent supplying means for supplying a driving current for connection point between said organic electroluminescence connected with said organic electroluminescence element at a same polarity direction in series, a second dlode element connected with the organic electroluminescence element in a emission instruction, comprising: a first diode element ejectroluminescence element emit light in response to a light light emitting circuit for making an organic

tirst diode element in response to the light emission crucant of said organic electroluminescence element and said Itght emission in the forward polarity direction to the serial to the polarity direction of the first diode element, driving element and said first diode element, in a direction contrary

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electroluminescence element and said second diode element in AOTESGE to the serial circuit of said organic rustraction, and reverse bias application means for applying a

electroluminescence element does not emit light. said organic electroluminescence element when said organic the direction contrary to the forward polarity direction of

According to the invention, there is provided a display

direction to the serial circuit of said organic driving current for Light emission in the forward polarity rucjnges qriatud cnrrent supplying means for supplying a direction of the first diode element, and said driving means Eirst diode element, in a direction contrary to the polarity perween said organic electroluminescence element and said said organic electroluminescence element at a connection point direction in series, and a second diode element connected with organic electroluminescence element in a same polarity cell includes a first diode element connected with said emitting cell specifying means, wherein said light emitting perud tu the light emitting cell specified by said light element emit light, said organic electroluminescence element quintud mesus tor making an organic electroluminescence Trapt emitting cells in accordance with input image data; and one light emitting cell to be driven to emit light of said Trdpt emfffrud ceff abectfying means for abecifying a least ejectroluminescence elements are arranged in a matrix shape; Trapt emitting cells respectively including organic genice compristng: a display panel in which a plurality of

electroluminescence element and said first diode element in response to the light emission instruction, and reverse bias application means for applying a voltage to the serial circuit of said organic electroluminescence element and said second diode element in the direction contrary to the forward polarity direction of said organic electroluminescence element made of the forward.

Jught.

According to the present invention, there is provided a

According to the present invention, there is provided a said organic electroluminescence element does not emit light. qirection of said organic electroluminescence element when element in the direction contrary to the forward polarity organic electroluminescence element and said capacitive means for applying a voltage to the serial circuit of said the iight emission instruction; and reverse bias application capacitive element through said diode element in response to to said organic electroluminescence element and said mesus tor supplying a driving current in the forward direction element and said diode element; driving current supplying of the connection point of said organic electroluminescence polarity direction in series; a capacitive element connected with said organic electroluminescence element in a forward emission instruction, comprising: a diode element connected ejectroluminescence element emit light in response to a light Tight emitting circuit for making an organic

light emitting circuit for making an organic

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ot the driving current by said driving current supplying opposite to said connection point, after finishing the supply potential to one end of said capacitive element on a side and second potential application means for applying the first grode element in response to the light emission instruction; torward direction to said capacitive element through said carrent supplying means for supplying a driving current in the ejement on a side opposite to the connection point; driving potential, to one end of said organic electroluminescence spplying a first potential, which is higher than a reference and said diode element; first potential application means for connection point of said organic electroluminescence element with said organic electroluminescence element at the polarity direction in series; a capacitive element connected with said organic electroluminescence element in a forward emission instruction, comprising: a diode element connected erectrofuminescence element emit frapt in response to a light

According to the present invention, there is provided a

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display device comprising; a display panel in which a plurality of light emitting cells respectively including organic electroluminescence elements are arranged in a matrix shape; light emitting cell specifying means for specifying a least one light emitting cell to be driven to emit light of said light emitting cells in accordance with input image data; and driving means for making an organic electroluminescence and driving means for making an organic electroluminescence element emit light, said organic electroluminescence element

According to the present invention, there is provided a said organic electroluminescence element does not emit light. qrxectron ot said organic electroluminescence element when element in the direction contrary to the forward polarity organic electroluminescence element and said capacitive mesus tor applying a voltage to the serial circuit of said the light emission instruction, and reverse bias application cabacttive element through said diode element in response to direction to said organic electroluminescence element and said supplying means for supplying a driving current in the forward grode element, and said driving means includes driving current point of said organic electroluminescence element and said series, and a capacitive element connected at the connection efectroluminescence element in a forward polarity direction in cell includes a diode element connected with said organic emitting cell specifying means, wherein said light emitting perud in the light emitting cell specified by said light

display device comprising; a display panel in which a prurality of light emitting cells respectively including caganic electroluminescence elements are arranged in a matrix sabe; light emitting cells in accordance with input inspecence and driving means for making an organic electroluminescence element emitting cells in accordance with input inspecace and driving means for making an organic electroluminescence element emit light, said organic electroluminescence element emit light, said organic electroluminescence element emit light emitting cell specifying means, said light emitting cell specifying means, said light emitting cell specifying means, said light emitting cell specifying means.

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includes a diode element in a forward polarity direction in electroluminescence element in a forward polarity direction in saries, and a capacitive element connected with said organic electroluminescence element at the connected with said clode element, organic electroluminescence element and said diode element, and said diving means includes first potential application and said driving means includes first potential application acceptance potential, to one end of said organic electroluminescence element on a side opposite to the electroluminescence element on a side opposite to the connection point, driving current supplying means for supplying a driving current in the forward direction to said connection point, driving current in the forward direction to said capacitive element through said diode element in response to the light emission instruction, and second potential

supplying a driving current in the forward direction to said capacitive element through said diode element in response to the light emission instruction, and second potential to one end application means for applying the first potential to one end of said capacitive element on a side opposite to said connection point, after tinishing the supply of the driving current by said driving current applying means.

Brief Description of Drawings Fig. 1 shows an equivalent circuit of an EL element.

Fig. 2 schematically shows the driving voltage - current -

luminance characteristic of the El element. Fig. 3 is a block diagram showing an embodiment of the

Fig. 4 shows a potential in each operation mode of each point of a Light emitting cell of Fig. 3.

Fig. 5 is a block diagram showing another embodiment of

the present invention.

present invention.

Fig. 6 shows a potential in each operation mode of each

- point of the light emitting cell of Fig. 5.
- Fig. 7 is a block diagram showing another embodiment of
- the present invention.
- Fig. 8 shows a potential in each operation mode of each
- point of the light emitting cell of Fig. 7.
- Fig. 9 is a block diagram showing another embodiment of
- Fig. 10 shows a potential in each operation mode of each
- Fig. 10 shows a potential in each operation mode of each
- point of the light emifting cell of Fig. 9. Fig. 11 is a block diagram showing another embodiment of
- the present invention.
- Fig. 12 shows a potential in each operation mode of each
- point of the light emitting cell of Fig. 11. Detailed Description of the Invention
- Hereinaffer, embodiments of the present invention will be
- described in details with reference to the drawings. Fig. 3 shows the structure of a display device to which
- the present invention is adopted. The display device comprises a display panel 11, a display controller 12, a scenning reverse bias circuit 13, and a driving current
- supplying circuit 14.

As illustrated in Fig. 3, the display panel il includes

driving lines Al to Am in the vertical direction and scanning being arranged in a matrix shape, and light emitting cells $20_{1,1}$ to $20_{m,n}$ in the respective intersections formed by the

driving lines Al to Am and the scanning lines Bl to Bn. The in parallel to the respective scanning lines Bl to Bn.

The light emitting cells 201,1 to 202,n all consist of the

same components. Taking the light emitting cell 20,1,2 as an example, for the sake of explanation, it is provided with an EL element 21 and two diodes 22 and 23. The anode of the thereof is connected to the driving line Al and the cathode thereof is connected to the positive electrode of the EL element 21 and the snode of the diode 23. The negative electrode of the EL element 21 and the cathode of the diode 23. The negative electrode of the EL element 21 is connected to the scanning line Bl and the cathode of the diode 23 is connected to the reverse bias line Cl.

The display controller IS generates a bias control asignal, and a scanning signal based on an input image data. The scanning signal is a signal for selecting one scanning lines in turn, of the scanning lines Bl to be display one scanning lines in turn, of the scanning lines Bl signal for instructing supply of a driving ourrent to at least cone of the driving lines Al to Am, corresponding to the EL element to be made emit light depending on the image data, of the EL elements of m light depending on the smage data, of the EL elements of m light emitting cells on the one scanning line. The bias line of the reverse bias line of the scanning reverse bias line of the reverse bias line of the scanning timing later than the scanning timing later than the scanning timing later than the scanning elements of m light emitting based on the scanning signal and instructing application of a reverse bias voltage signal and the EL elements of m light emitting cells on the scanning

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reverse bias line. The scanning signal and the bias control the driving control signal is supplied to a driving current

The scanning reverse bias circuit 13 includes reverse bias switches 31, to 31, and scanning switches 32, to 32,, which are respectively connected to the reverse bias lines CI to Cn and the scanning lines BI to Bn. The reverse bias switches 31, to 31, are provided corresponding to the reverse bias switches 31, to Cn, so as to supply one of a potential Vocl and a ground potential (reference potential) selectively to the respective control signal. The scanning switches 32, to 32, are provided corresponding to the scanning lines BI to Bn, so as to supply control signal. The scanning lines BI to Bn, so as to supply corresponding to the scanning lines BI to Bn, so as to supply corresponding to the scanning lines BI to Bn, so call supply corresponding to the scanning lines BI to Bn, so cordence with to the respective scanning lines BI to Bn, in accordance with to the respective scanning lines BI to Bn, in accordance with

The driving current supplying circuit 14 includes current sources 33, to 33, which are respectively connected to the driving lines Al to Am. The current sources 33, to 33, supply a driving current to at least one of the driving lines Al to Am. In accordance with the driving control signal.

the scanning signal. Here, Vccl>Vcc2.

supplying circuit 14.

In the display device constituted above, the operation in the case of making the Ki element 21 of the light emitting described with reference to Fig. 4. In the description, a propertial (potential of the driving line Al) applied to the

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anode end of the diode 22 is defined as Pa, a potential (potential of the scanning line B1) applied to the negative electrode of the EL element 21 is defined as Pb, a potential of the reverse bias line C1) applied to the cathode end of the diode 23 is defined as Pc, and a potential applied to the positive electrode of the EL element 21 is defined as Pb, as illustrated in Pig. 3.

In the case of light emission of the EL element 21, there

are a scanning mode for scanning the line of the light emitting cells $20_{1,1}$ to $20_{m,1}$, a light emission continuous mode for maintaining light emission of the EL element 21 just after finishing the scan, and a reverse bias application mode for applying a reverse bias voltage to the EL element 21, as applying a reverse bias voltage to the EL element 21, as illustrated in Fig. 4,

In the scanning mode, the reverse bias switch $\operatorname{3l}_1$ and the

scenning switch 32, each perform a switching operation in accordance with a scenning signal from the display controller L2, the reverse bias switch 31, relays the potential Vccl to the reverse bias line Cl, and the scanning switch 32, relays the ground potential to the scanning line Bl. Simultaneously with the relay operations, the current source 33, supplies the driving current to the driving line Al in accordance with a driving current to the driving line Al in accordance with a driving control signal from the display controller 12.

Namely, since the diode 22 turns on, the driving current from the current source 33, flows into the ground through the driving line Al, the diode 22, the EL element 21, the scanning

Line Bl, and the switch 32,. The BL element 21 emits light by the flow of the driving current. Further, the driving current charges the capacitive component of the EL element 21.

The potential Pa of the driving line Al becomes, for example, about 10V, the potential Pb of the scanning line Bl becomes OV that is the ground potential, the potential Pc of the reverse bias line Cl becomes Vccl, and the positive electrode potential Pd of the El element 21 becomes about 7V. Since there is a relationship of VoclyVccs>7V, the diode 23 is in a reverse bias state, and electric charge is stored into the depletion layer capacitor of the diode 23.

passes, the contents of the scanning signal and the driving control signal from the display controller 12 are changed, the scanning line B1 is finished, and the selected scanning line is shifted to the scanning line B2. Thus, the light emission continuous mode is started. Since the scanning switch 32, performs a switching operation, the potential Voc2 switch 32, performs a switching operation, the potential Voc3 current source 33, stops a supply of the driving current to the driving line A1.

Mhen a scanning time assigned to the scanning line Bl

of the driving line Al becomes OV, the potential Pb of the scanning line Bl becomes Vco2, and the potential Pc of the reverse bias line Cl remains at Vcol. Since the capacitive component in the EL element 31 has accumulated charge, and the depletion layer capacitor of the diode 23 also has the

In the light emission continuous mode, the potential Pa

accumulated charge, the accumulated charges flow into the diode component of the EL element 31 as a driving current in the forward direction, so as to maintain the light emission of the EL element 21. Accordingly, the positive electrode protential Pd of the EL element 31 becomes about Vcc2+5V. The EL element 31 stops the light emission when the voltage across the EL element 31 stops the Light emission when the voltage across the EL element 31 in the forward direction becomes lower than a light emission threshold voltage With in accordance with

Means of the accumulated charges. When a bias controller 12

Is generated, the reverse bias application mode is started. In the scanning reverse bias circuit 13, the reverse bias switch 31, performs a switching operation in response to the switch 31, performs a switching operation in response to the instead of the potential Voc1 to the reverse bias line Cl. At the potential Voc1 to the reverse bias line Cl. At the potential Voc1 to the research potential Voc3 at the potential Pb of the scanning line Bl and potential Voc3 at the potential Pb of the scanning line Bl and the potential Of the residual Charge of the EL element 21, the diode 23 turns on. By the turning-on of the diode 23, the positive electrode potential Pb is substantially changed to positive in the residual charge is substantially changed to the ground potential OV. Accordingly, the EL element 21 is in a reverse bias state and is provided with refresh sction.

Even when the reverse bias switch 31, and the scanning Freen when the reverse bias switch 31, and the scanning

switch 32, have performed the switching operation, in accordance with a scenning signal from the display controller 12 for the scan of the scanning inde

where the EL element 21 does not emit light, the current source 33, is in an inactive state and does not supply a driving current to the driving line Al. The positive electrode potential Pd at this time becomes about 3V.

Pig. 5 shows another embodiment of the present invention.

A display device of Fig. 5 includes a display panel 11, a display controller 12, a scanning reverse bias circuit 13, and a display controller 12, a scanning reverse bias device of Fig. 3. The display panel 11 and the display controller 12 are the same as those of Fig. 3. The scanning reserve bias circuit 13 includes reverse

bias switches 41, to 41, and scanning switches 42, to 42, which are respectively connected to the reverse bias lines CI to Cn and the scanning lines BI to Bn. The reverse bias switches 41, to 41, are provided corresponding to the reverse bias lines CI to Cn, so as to supply one of a potential Vcol, a potential Vcol, and a ground potential selectively to the respective reverse bias lines CI to Cn in response to a bias control corresponding to the scanning switches 42, to 42, are provided corresponding to the scanning lines BI to Bn, so as to supply one of a potential Vcc3 and the ground potential selectively to the respective scanning lines BI to Bn in accordance with a scanning signal. Here, there are relationships of

Vool>Voos>Voos and Vool-Voos=Voos.
The driving current supplying circuit 14 includes current

sources 33_1 to 33_a and switches 43_1 to 43_a , which are respectively connected to the driving lines h1 to hm. The

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dround potential respectively in response to the driving change the potentials of the driving lines Al to Am to the control signal. The switches 43, to 43, are turned on to the diluting lines al to Am in accordance with a driving controut sources 33, to 33, supply a driving current to any of

cells $\Sigma 0_{1,1}$ to $\Sigma 0_{m,1}$, a light emission continuous mode for acsuntud mode tor acsuntud the line of the light emitting the EL element 21 of the Light emitting cell 201,1 emit light obecstion in the case where the display controller 12 makes In the display device constituted as shown in Fig. 5, the control stdnal.

illustrated in Fig. 6. spplying a reverse bias voltage to the KL element 21, as tintshing the scan, and a reverse bias application mode for maintaining light emission of the EL element 21 just after will be described with reference to Fig. 6. There are a

to supply a driving current to the driving line Al and the emission of the EL element 21, the current source 33, operates control signal from the display controller 12, for the light with these relay operations, in accordance with a driving the ground potential to the scanning line Bl. Simultaneously the reverse bias line Cl, and the scanning switch 42_1 relays IS, the reserve bias switch 41, relays the potential voc2 to seconquice with a seanning signal from the display controller acsuntud switch 42, each perform a switching operation in

In the scanning mode, the reverse bias switch 41, and the

switch 43, is turned off.

Since the diode 22 turns on, the driving ourrent from the current source 33_1 flows into the ground through the driving line Bl, and the switch 42_1 . This flow of the driving ourrent makes the En element 21 emit light. The driving ourrent charges the capacitive component of the BL element 21.

The potential Pa of the driving line Al becomes, for example, about 10V, the potential Pb of the scanning line Bl becomes 0V that is the ground potential, the potential Pc of the reverse bias line Cl becomes VCCZ, and the positive electrode potential Pd of the EL element 2l becomes about 7V.

Since there is a relationship of VCCI>VCCZ>VV, the diode 23 is since there is a relationship of VCCI>VCCZ>VV, the diode 23 is

Mhen a scanning time assigned to the scanning line Bl

depletion layer capacitor of the diode 23.

passes, it turns into the light emission continuous mode. In the light emission continuous mode, the contents of the scanning signal from the scanning signal and the driving control signal from the display controller is are changed, the scanning line is shifted to the scanning line B2. Thus, the reverse bias switch 41, and the scanning line B2. Thus, the potential Voci to the reverse bias switch 41, relays the potential Voci to the potential Voci to the scanning line C1, and the scanning switch 42, each perform a switch 42, relays the potential Voci to the reverse bias line C1, and the scanning switch 42, relays the current source 33, stops the supply of the driving line A1 and the switch 43, is turned on, the driving line A1 and the switch 43, is turned on,

alternatively, it supplies the driving current to the driving line Al again, for the light emission of the EL element of the Light emitting cell at the infersection of another selected scanning line and the driving line Al and the switch 43, is turned off.

In the light emission continuous mode, when stopping the

the accumulated charges. Thus, the light emission continuous voltage Vth (for example, 3V) in accordance with a decrease of direction becomes lower than the light emission threshold when the voltage across the EL element 21 in the forward about Vcc3+7V. The EL element 21 stops the light emission bostitve electrode potential Pd of the EL element 21 becomes the Light emission of the EL element 21. Accordingly, the a driving current in the forward direction, so as to maintain cystaes ifow futo the diode component of the BL element 21 as qioqe 53 also has the accumulated charge, the accumulated scommingted cystae and the depletion layer capacitor of the gruce the capacitive component in the EL element 21 has the potential Po of the reverse bias line Cl increases to Vccl. bp of the scanning line Bl increases to Vcc3, and the boseustst Pa of the driving line Al becomes UV, the potential andbyl of the driving current to the driving line Al, the

Is is generated, the reverse bias application mode is started. In the reverse bias application mode, the reverse bias sylication $\omega_{\rm d}$, in the scenning reverse bias circuit 13 performs a

mode is finished.

Myen the bias control signal from the display controller

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whitching operation in response to the bias control signal from the display controller 12, so as to supply the ground potential OV instead of the potential Vool to the reverse bias line Cl. At this time point, since the positive electrode potential Pd of the EL element 21 is a potential level obsential Pd of the EL element 21 is a potential level of the scanning line Bl and the potential of the residual charge of the EL element 21, the diode 23 turns on. By the turning-on of the diode 23, the positive electrode potential Pd is substantially changed to a voltage of the diode 23. Since the positive electrode potential Pd is VO) which is equal to the on-voltage of the diode 23. Since the positive electrode potential Pd is southly changed to a voltage of the diode 23. Since the positive electrode potential Pd is lower than the potential Voc3 of the potential Pd is least state and is provided with refresh sction.

Even when the reverse bias switch 41, and the scanning switch 42, have performed the switching operation in response to the scanning signal from the display controller 12, for the scanning line Bi, in the scanning mode where the EL alement 21 does not emit light, the current source 33, is in an inactive state and does not supply a driving current to the driving line Al and the switch 43, is turned on. The positive electrode potential Pd at this time becomes about 3V.

A display device in Fig. 7 is designed so that the potential Vcc3 is always applied to the scanning lines BI to Bn, without having the scanning switches 42, to 42, in the scanning reverse bias circuit 13 shown in Fig. 5. The other structure is the

Fig. 7 shows another embodiment of the present invention.

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In the display device constituted as shown in Fig. 7, the same as that of the display device of Fig. 5.

In the scanning mode, the reverse bias switch 41, performs will be described with reference to Fig. 8. the EL element 21 of the light emitting cell $20_{1,1}$ emit light obecation in the case where the display controller l2 makes

emission of the KL element 21, and the switch 43, is turned supply a driving current to the driving line Al, for the light the display controller 12, the current source 33, operates to relay operation, in response to a driving control signal from Vcc2 to the reverse bias line Cl. Simultaneously with the trom the display controller l2 so as to relay the potential s switching operation in accordance with a scanning signal

TITURETRACED) of the potential Vcc3 through the driving line carrent source 33, flows into the power source (not Stude the diode 22 turns on, the driving current from the

. TIO

Ifght. The driving current charges the capacitive component Lyts tjow of the driving current makes the EL element 21 emit Al, the diode 22, the EL element 21, and the scanning line Bl.

The potential Pa of the driving line Al becomes, for of the EL element 21.

layer capacitor of the diode 23. pres arete sud efectric charge is stored into the depletion relationship of Vccl>Vcc3+7V, the diode 23 is in a reverse EL element 21 becomes about Vcc3+7V. Since there is a example, Vcc3+10V, the positive electrode potential Pd of the

When a scanning time assigned to the scanning line BI passes, the contents of the scanning signal and the driving control signal from the display controller 12 are changed and the scanning line BI remains at Voc3. Thus, the light emission continuous mode is started, and the reverse blas switch 41, performs a switching operation to relay the potential Vcc1 to the reverse blas line Cl.

Simultaneously with the switch operation, the current source the potential Vcc1 to the reverse blas line Cl.

33, stops the supply of the driving current to the driving line Al and the switch 43, is turned on, alternatively, it supplies as the driving ourrent to the driving line and the switch 43, and the driving line and the switch 43, and the driving line and the supply of the driving current to the driving line and the switch 43, and the driving line and the driving current to the driving line and the supplies of the driving ourrent to the driving line and the driving current of another selected scenning line and the driving interestion of another selected scenning line and the driving interestion of another selected scenning line and the driving interestion of another selected scenning line and the driving interestion of another selected scenning line and the driving interestion of another selected scenning line and the driving interesting the driving current of another selected scenning line and the driving interesting the driving interesting the driving drivers and the driving interesting drivers and the driving interesting drivers and the driving interesting driving driving driving drivers and the driving driving driving driving driving driving driving drivers and the driving dr

In the light emission continuous mode, the potential Pe of the of the driving line Al becomes 0V and the potential Pe of the reverse bias line Cl increases to Vocl when stopping the supply of the driving current to the driving line Al. Since the capacitive component in the EL element 21 has the accumulated charge and the depletion layer capacitor of the diode 23 also has the accumulated charge, the accumulated charges flow into the diode component of the EL element 21 as a chiving current in the forward direction, so as to maintain the Light emission of the EL element 21.

line Al and the switch 43, is turned off.

The positive electrode potential Pd of the EL element 21 increased by Vy=Veclxcday(Cd33+Cell) by functioning the

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both capacities of the charged capacity Cell of the EL element 21 and the charged capacity Cd23 of the diode 23. The EL element 21 stops the Light emission when the voltage in the forward direction of the EL element 21 becomes lower than the light emission threshold voltage Vth (for example, 3V) in accordance with to a decrease of the accumulated charges, thereby finishing the light emission continuous mode.

time of maintaining the light emission of the EL element 21 is Vy-Voc3+Va, the positive electrode potential Pd becomes Vcc3+Va-Vy when the EL element 21 emits light at a selection of the next scanning line Bl. Here, Va is about 7V.

Wasuming that the positive electrode potential Pd at the

display confroller 12, the reverse bias application mode is started. In the reverse bias application mode, similarly to the device of Fig. 5, in the scanning reverse bias circuit 13, the device of Fig. 5, in the scanning reverse bias circuit 13, the reverse bias switch 41, performs the supplies the ground according to a bias control atgnal and supplies the ground potential 0V, instead of the potential Vccl, to the reverse potential by of the EL element 31 is the positive electrode obtained by adding the potential Vcc3 at the potential phof the scanning the BI and the potential of the residual changes, the diode 23 is turned on. By turning on the diode 23, the positive electrode potential Pd is changed to the potential (for example, I to 2 V) equal to the on-voltage of potential (for example, I to 2 V) equal to the operatial (for example, I to 2 V) equal to the operatial (for example, I to 2 V) equal to the operatial (for example, I to 2 V) equal to the operatial Vcc 23. Since the positive electrode potential Pd is

lower than Voc3 at the potential Pb, the EL element 21 is in a reverse bias state and is provided with refresh action. Even when the reverse bias switch 41, has performed the

switching operation in accordance with a scanning signal from the display controller 12, for the scan of the scanning line Bl, in the scanning mode where the BL element does not emit supply a driving current to the driving line Al, and the switch 43, is furned on. The positive electrode potential Pd switch 43, is furned on. The positive electrode potential Pd corrections and the scanning line Al, and the scanning positive electrode potential Pd corrections.

In the above-mentioned respective embodiments, although one light emitting cells, that are a red light emitting cell, a green light emitting cells, that are a blue light emitting cell, are formed in one pixel, in a color display matrix typed display panel. In the above embodiments, it is not necessary to supply a

bias control signal from the display control circuit 12 for each scan. For exemple, the bias control signal may be supplied once every scans by a predetermined number of times.

the present invention is adopted. The display device includes a display panel 11, a display controller 12, a scanning reverse bias circuit 13, and a driving current supplying circuit 14, which are similar to the display device shown in

As illustrated in M4. 9, the display panel II includes driving lines Al to Am in the vertical direction and scanning

Fig. 3.

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lines B1 to Bn in the horizontal direction (line direction) being arranged in a matrix shape, and light emitting cells 20_{1,1} to 20_{9,n} in the respective intersections formed by the diriting lines A1 to Am and the scanning lines B1 to Bn. The display panel 11 further includes reverse bias lines C1 to Cn in parallel to the respective scanning lines B1 to Bn.

The light emitting cells 20,1, to 20,2,3 all consist of the same components. Taking the light emitting cell 20,1, as an example, for the sake of explanation, it is provided with an EL element 21, a diodes 22 and a capacitor 24. The anode of the diode 22 is connected to the driving line Al and the cathode thereoff is connected to the positive electrode of the negative electrode of the same of the anomal 21 and one end of the capacitor 24. The negative electrode of the FL element 21 and one end of the capacitor 24. The negative school of the FL element 21 and one end of the capacitor 24. The negative

the reverse bias line Ci.

The display controller IN generates a bias control asgnal, and a scanning signal based on an input image data. The scanning signal is a signal for selecting one scanning line in turn, of the scanning lines Bl to Bn during one frame. The driving control signal is a signal for instructing supply of a driving current to at least signal for be driving increased as a connect to be made emit light depending on the image data, of the EL elements of m light empending on the image data, of lines. The bias control signal is a signal for selecting one traces of the increase bias line of the image data, of the EL elements of m light empending on the seanning line. The bias control signal is a signal for selecting one traces bias line of the reverse bias line of the reverse bias line of the reverse bias lines CI to Cn at a reverse bias line of the reverse bias line of the reverse bias lines CI to Cn at a

timing later than the scanning timing based on the scanning signal and instructing application of a reverse bias voltage to the EL elements of m light emitting cells on the one reverse bias line. The scanning signal and the bias circuit 13 and signal are supplied to a scanning reverse bias circuit 13 and signal are supplied to a scanning reverse bias circuit 13 and signal are supplied to a driving current the driving control signal is supplied to a driving current

supplying circuit 14.

The scanning reverse bias circuit 13 includes reverse bias switches 31, to 31, and scanning switches 32, to 32,, which are respectively connected to the reverse bias lines Cl to Cn and the scanning lines Bl to Bn. The reverse bias switches 31, to 31, are provided corresponding to the reverse bias switches 31, to Cn, so as to supply one of a potential Vcc and a ground potential (reference potential) selectively to the respective reverse bias lines Cl to Cn, in accordance with the bias reverse bias lines Cl to Cn, in accordance with the bias control signal. The scanning switches 32, to 32, are provided corresponding to the scanning lines Bl to Bn, so as to supply corresponding to the scanning lines Bl to Bn, so as to supply corresponding to the scanning lines Bl to Bn in accordance with the scanning signal. Here, there is a relationship of Vcc>7V.

sources 33, to 33, and switches 43, to 43,, which are respectively connected to the driving lines Al to Am. The current sources 33, to 33, supply a driving current to any of the driving lines Al to Am in accordance with a driving control signal. The switches 43, to 43, respectively supply the ground potential to the driving lines Al to Am in

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secondance with the driving control aignal.

electrode of the EL element 21 is defined as Pb, a potential (bosentist of the scanning line B1) applied to the negative smode end of the diode 22 is defined as Pa, a potential boceutist (potential of the driving line Al) applied to the described with reference to Fig. 10. In the description, a cell 201,1 emit light by the display controller 12 will be the case of making the EL element 21 of the Light emitting In the display device constituted above, the operation in

In the case of light emission of the EL element 21, there defined as Pd, as illustrated in Fig. 9. spplied to the positive electrode of the EL element 21 is end of the capacitor 24 is defined as Pc, and a potential (potential of the reverse bias line Cl) applied to the other

illustrated in Fig. 10. oberstion modes of the light emitting cell 2011, as applying a reverse bias voltage to the KL element 21, as Italiahing the scan, and a reverse bias application mode for for maintaining light emission of the EL element 21 just after emitting cells 201,1 to 20m,1, a light emission continuous mode are a scanning mode for scanning the line of the light

13. The reverse bias switch $3L_1$ relays the ground potential 0Vsccordance with a scanning signal from the display controller sesuntud switch 32, each perform a switching operation in In the scanning mode, the reverse bias switch 31, and the

the ground potential OV to the scanning line BI.

to the reverse bias line Cl, and the scanning switch 32, relays

Simultaneously with the above relay operations, the current source 33, supplies a driving cuntrol signal from the display accordance with a driving control signal from the display controller 12, for the purpose of the light emission of the EL

element 21, and the switch 43, is turned off.

Since the diode 22 turns on, the driving current from the current source 33_1 flows into the ground through the driving line line Al, the diode 22, the EL element 21, the scanning line Bl, and the switch 32_1 . The EL element 21 emits light by the flow of the driving current. Further, the driving current flow of the driving current of the EL element 21. Further, part of the driving current eron from the current source Further, part of the driving current from the current source 33_1 flows into the ground through the diode 22, the capacitor 24, and the reverse bias switch 31_1 , as a charging current, to

Line Al becomes, for example, about 10V, the potential Pb of the scanning line Bl and the potential Pc of the reverse bias line Cl become 0V that is the ground potential, and the postitive electrode potential Pd of the EL element 21 becomes about 7V.

In the scanning mode, the potential Pa of the driving

charge the capacitor 24.

passes, the light emission continuous mode is started. In the significant emission continuous mode, the contents of the scanning significant the display controller 12 are changed, the scan of the scanning line Bl is

Myon a scanning time assigned to the scanning line Bl

scanning line B2. Thus, the reverse bias switch 31₂ and the sonning switch 32₁ each perform a switching operation. The reverse bias switch 31₂ relays the potential Voc to the scanning ine B1. Simultaneously with the switching operations, the current source 33₂ stops the supply switching operations, the current source 33₂ stops the supply

Vcc to the scanning line Bl. Simultaneously with the switching operations, the current source 33, stops the supply of the driving current to the driving line Al and the switch to the driving line Al for light emission of the EL element of the light emitting oell at the intersection of another selected scanning line and the driving line Al, and the switch

 \mathfrak{t}_{3_1} is turned off. In the light emission continuous mode, when the supply of

the driving current to the driving line AI is stopped, the potential Pa of the driving line AI becomes 0V and the diode 22 turns off. The potential Pb of the scanning line BI and the potential Pc of the rewerse bias line CI increase to Voc. Since the capacitive component in the EL element 21 has the accumulated charge and the capacitor 24 has the accumulated component of the EL element 21 as a driving current in the forward direction so as to maintain the 11ght emission of the EL element 21 as a driving current in the forward direction so as to maintain the 11ght emission of the EL present 21. Accordingly, assuming that the positive electrode potential Pd of the EL element 21 is about Voc+Vx, Vx=VV. The EL element 21 stops light emission when the voltage across the EL element 21 stops light emission when the voltage across the EL element 21 in the forward direction becomes lower than the

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Trays emission confinence mode is finished. accordance with a decrease of the accumulated charges and the

In the reverse bias application mode, the reverse bias switch is generated, the reverse bias application mode is started. Much a bias control signal from the display controller l2

of the driving current to the driving line Al and the switch of the KL element 21. The current source 33, stops the supply the capacitor 24, namely, the positive electrode potential Pd change in the potential at the one end on the opposite side of capacitor 24 on the side of the reverse bias line Cl means a A change from the potential vcc to 0v at the other end of the ON instead of the potential Vcc to the reverse bias line Cl. the display controller 12 so as to supply the ground potential switching operation in response to a bias control signal from 31, in the scanning reverse bias circuit 13 performs a

ra a nortede opterued by dividing the potential Vcc by two Ceff and the charged capacity of the capacitor 24 is C24, VB sasaming that the charged capacity of the KL element 21 is Cl is represented by Va+VB. Va=3V is maintained. Further, element 21 after the potential change of the reverse bias line Assume that the positive electrode potential Pd of the EL

431 Is furned on.

terminals of the EL element 21 becomes Va+Vb-Vcc. VccxCell/(Cell+C24). The forward voltage Vell between the charged capacities Cell and C24, namely VF=

tor exemple, C24 is set two to four times larger than Cell so When the potential Vcc is set at a fairly high level and,

as to satisfy the relationship of CX4/CG11, the voltage Vell between the terminals of the EL element 21 becomes lower than VV. Thus, the EL element 21 is in a reverse bias state and is provided with refresh action.

In the reverse bias application mode, since the residual charges of the capacitor 24 and the KL element 21 remain as they are, the positive electrode potential Pd is maintained. When the reverse bias application mode is finished in accordance with a disappearance of the bias control signal from the display controller 12, the reverse bias switching operation to relays the potential Vcc to performs a switching operation to relays the potential Vcc to entered bias line Cl similarly to the case of the Light emission continuous mode. The positive electrode potential Pd emission continuous mode. The positive electrode potential Pd of the KL element 21 increases by Vcc and returns into a potential level obtained by adding the potential vcc at the potential Pd of the scanning line Bl and the potential of the potential Pd of the scanning line Bl and the potential of the

switch 32, have performed the switching operation in accordance with a scanning signal from the display controller 12, for the scan of the scanning mode where the EL alement 21 does not emit light, the current source 33, is in an insotive and the switch 43, is in on. Thus, no driving an entering the driving line Al. The positive current is supplied to the driving line Al. The positive electrode potential Pd at this time becomes about 3V.

Even when the reverse biss switch 31^{1} and the scanning

residual charges.

In the above embodiments, it is not necessary to supply a bias control signal from the display controller l2 in every

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once every scans by a predetermined number of times. scsu. For example, the bias control signal may be supplied

Eig. 11 shows further snother embodiment of the present Ground potential, the switches 43_1 to 43_m are not necessary. sources 33, to 33,, if the output line thereof becomes the 43, to 43,. At the inactive time of each of the current to we have the ground potential, respectively by the switches In the above-mentioned embodiments, the driving lines Al

If we'd be designed to apply the potential Vcc directly to the structure is the same as that of the display device of Fig. 9. 13, a bias control atgnal is not supplied. The other the display controller 12 to the scanning reverse bias circuit Trues BI to Bn. Although a scanning signal is supplied from is designed to always apply the potential voc to the scanning circuit 13 as mentioned in the display device of Fig. 9 and it seguutud satiches $3S^{T}$ to $3S^{B}$ tu the seguntud reverse biss runeutrou. A display device of Fig. 11 does not includes the

scanning lines Bl to Bn. emitting cells 20,1,1 to 20,1,1 without passing through the negative electrode lines of the KL elements of the light

Tranf will be described with reference to Fig. 12. makes the EL element 21 of the Light emitting cell 20,, emit the operation in the case where the display controller l2 In the display device constituted as shown in Fig. 11,

juctodes a scanning mode for scanning the line of the light Fig. 11, the operation mode of the light emitting cell 20,1,2 In the case of light emission of the EL element 21 in

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emitting cells $20_{1,1}$ to $20_{m,1}$ and a light emitting mode of making the EL element 21 emit light just after finishing the scan, as

illustrated in Fig. 12. In the scanning mode, the reverse bias switch $3l_{\scriptscriptstyle 1}$ performs

s switching operation in accordance with a scanning signal from the display controller 12, to relay the potential Voc to the reverse bias line Cl. Simultaneously with the relay operation, the current source 33, supplies a driving current to the driving line Al in accordance with a driving control signal from the display controller 12 to make the EL element at mat light and the switch 43, is turned off.

Since the diode 22 turns on, the driving current from the Since the diode 22 turns on, the driving current from the

current source 33, flows into the ground through the driving line Al, the diode 22, the capacitor 24, the reverse bias line Cl, and the reverse bias switch 31,. Namely, the driving current charges the capacitor 24 as a charging current.

When the charging current flows, the negative electrode

potential Pb of the EL element 21 is Voc, while the positive electrode potential Pd is lower than Voc and about 7V+VY. Therefore, the EL element 21 is in a reverse bias state and emits no light.

is defined as Cell and that the charged capacity of the capacities that the potential Vcc is divided by the two charged capacities Cell and Ca4. When the potential Vcc is set at a

yearming that the charged capacity of the EL element 21

Limes larger than Cell so as to satisfy the relation of C24>Cell, the voltage Vell between the terminals of the EL Therefore, the EL element 21 becomes about 7V+VY-Vcc which is lower than OV.

Therefore, the EL element 21 is in a reverse bias state and is

Therefore, the EL element 21 is in a reverse bias state and is

When a scanning time assigned to the line of the light emitting cells $20_{1,1}$ to $20_{4,1}$ passes, the contents of the scanning signal and the driving control signal from the display controller IX are changed, the selected scanning line is shifted to the line of the light emitting cells $20_{1,2}$ to $20_{4,2}$ although the potential Pb remains at Voc. Thus, the light emitting mode is started, the reverse bias switch 11_1 performs a switching operation to relay the potential Voc to the reverse bias inne CI. Simultaneously with the switching operation, the current source 33_1 stops the supply of the driving current to the driving the switch 43_1 is operation, the current source 33_1 stops the supply of the driving current to the driving current to the driving current to the driving current to operation, alternatively, it supplies the driving current to of the driving current to selected scanning line and the driving line of enother selected scanning line and the driving line of the switch

driving line Al becomes OV and the potential Pc of the reverse bias line Cl rises up to Vcc when stopping the supply of the driving line Al. The positive electrode potential Pd increases by a potential obtained by dividing the changed voltage Vcc of the potential Pc of the

In the light emitting mode, the potential Pa of the

431 is furned off.

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reverse bias line CI according to the proportion of the two charged capacities Cell and C24, resulting in 7V+Vcc in accordance with a change from Vy to Vcc. Since the voltage Vell between the terminals of the EL element 12 becomes about 7V, the EL element 21 amits light. When the voltage of the EL isoment 21 in the forward direction becomes lower than the light emission threshold voltage Vth (for example, 3V) in light emission threshold voltage Vth (for example, 3V) in element 21 stops the light emission and the light emitting element 21 stops the light emission and the light emitting

mode is finished.

Even when the reverse bias switch 31, has performed the switching operation in accordance with a scanning signal from the display controller 12, for the purpose of scanning the lisplay controller 12, for the purpose of scanning the mode where the EL element 21 does not emit light, the current source 33, is in an inactive and does not supply a driving current to the driving line it and the switch 43, is turned on. Current to the driving line is and the switch 43, is turned on. Decomes about 3V+VY and the EL element 21 turns into a reverse becomes about 3V+VY and the EL element 21 turns into a reverse line of the light emitting cells 20,,, to 20,,, passes and the selected scanning line is shifted to the light emitting cells 20,, the positive electrode potential emitting cells 20,, the positive electrode potential emitting cells 20,, the positive electrode potential

In the above-mentioned respective embodiments, although one light emitting cell per one pixel is shown, three light emitting cells, namely, a red light emitting cells, namely, a red light emitting

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peen described, the operations of the other light emitting although the operation of the light emitting cell $20_{1,1}$ has Entitler, in the above-mentioned respective embodiments, ber one pixel in a color display matrix typed display panel. light emitting cell, and a blue light emitting cell are formed

pe broaded to the KL element to which a diode is connected in in order to improve the average luminance, refresh action can ys mentioned spove, according to the present invention, cells $\Sigma O_{1,2}$ to $\Sigma O_{m,n}$ are the same as above.

series, in a comparatively easy structure.

Claims

1. A light emitting circuit for making an organic electroluminescence element emit light in response to a light

emission instruction, comprising:
a first diode element connected with the organic

electroluminescence element in a same polarity direction in

serfes'

a second diode element connected with said organic electroluminescence element at a connection point between said organic electroluminescence element and said first diode element at a direction context to the molarity direction of

element, in a direction contrary to the polarity direction of the first diode element,

driving current supplying means for supplying a driving current for light emission in the forward polarity direction to the serial circuit of said organic electroluminascence element and said first diode element in response to the light emission instruction, and

the sarial oircuit of said organic electroluminescence element in the direction contrary to the forward polarity direction of said organic electroluminescence

reverse bias application means for applying a voltage to

element when said organic electroluminescence element does not

2. A light emitting circuit according to claim 1, wherein
said driving current supplying means includes a current source

said driving current supplying means includes a current source for supplying the driving current to one end of said first

a predefermined period in response to the Light emission instruction, and first switching means for supplying a reference potential to one end of said organic connection point when the driving current is supplied by said current source, and supplying a second potential, which is current source, and supplying a second potential, which is higher than the reference potential and lower than a first

potential, to the one end of said organic electroluminescence element when the driving current is not supplied by said current source, and

serg reverse bias application means includes second

switching means, after finishing the supply of the driving current by said current source, for supplying the first potential to one end of said second diode element on a side opposite to said connection point, and thereafter, supplying the reference potential to the one end of said second diode element on a side opposite to said connection point during a element on a side opposite to said connection point during a plant of the connection point during a part of the connection point during a side opposite to said connection point during a part of the connection when said organic electroluminescence element does not part of the connection when said organic electroluminescence element on a supplication of the connection of the

emit light.

3. A light emitting circuit according to claim 1, wherein said driving current supplying means includes a current source for supplying the driving current to one end of said first diode element on a side opposite to said connection point for a predetermined period in response to the light emission instruction, first switching means for supplying a reference potential to one end of said organic electroluminescence element on a side opposite to said connection point when the element on a side opposite to said connection point when the

driving current is supplied by said current source, and supplying a third potential, which is higher than the reference potential, to the one end of said organic supplied by said current source, and a switch for supplying the reference potential to one end of said first diode element to a saide opposite to said connection point when the driving current is not supplied by said current source, and

astd reverse bias application means includes second

switching means for supplying a second potential, which is higher than the third potential, to one end of said second diode element on a side opposite to said connection point when the driving current is supplied by said current by said current second current supplying a first potential, which is higher than the second potential, to the one end of said second diode element, and thereafter, supplying the reference potential to the one end of said second diode element.

4. A light emitting circuit according to claim 1, wherein said driving current supplying means includes a current source for supplying the driving current to one end of said first didde element on a side opposite to the connection point for a national period in response to the light emission higher than a reference potential, to one end of said organic higher than a reference potential, to one end of said organic electroluminescence element on a side opposite to said congentic connection point, and a switch for supplying the reference

obbosite to the connection point when the driving current is

not supplied by said current source, and

said reverse bias application means includes second switching means for supplying a second potential, which is higher than the third potential, to one end of said second diode element on a side opposite to said connection point when the driving current is supplied by said current source, supplying a first potential, which is higher than the second potential, to the one end of said second diode element.

end of said second diode element.

5. A display penel in which a plurality of light emitting
a display panel in which a plurality of light emitting

sud thereafter, supplying the reference potential to the one

ejements ere errendeg in e metrix spebe: cejjs resbectivejk including ordenic ejectrojuminescence

Ifght emitting cell specifying means for specifying a said light emitting sell to be driven to emit light of

driving means for making an organic electroluminescence element emit light, said organic electroluminescence element being in the light emitting cell specified by said light

and

emitting cell apecifying means, wherein said light emitting cell includes a first diode

ejement connected with said organic electroluminescence

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element in a same polarity direction in series, and a second diode element connected with said organic

electroluminescence element at a connection point between said organic electroluminescence element and said first diode element, in a direction contrary to the polarity direction of the first diode element, and

ssid driving means includes driving current supplying

means for supplying a driving current for light emission in the forward polarity direction to the serial circuit of said organic electroluminescence element and said first diode element in response to the light emission instruction, and reverse bias application means for applying a voltage to

the serial circuit of said organic electroluminescence element in the direction contrary to the forward polarity direction of said organic electroluminescence element when said organic electroluminescence electroluminescence electroluminescence electroluminescence electroluminescence element when said organic electroluminescence element when said organic electroluminescence element when said organic element element when element element

6. A display device according to claim 5, wherein said light emitting cell specifying means specifies said light emitting cell to be driven emit light by sequentially scanning a plurality of Lines of said display panel.

 A light emitting circuit for making an organic electroluminescence element emit light in response to a light

emission instruction, comprising:

a diode element connected with said organic electroluminescence element in a forward polarity direction in

serres:

emit light.

a capacitive electroluminescence element and said diode

element; driving current supplying means for supplying a driving

driving current supplying means for supplying a driving current in the forward direction to said organic aviitive element and said conscittive element.

through said diode element and said capacitive element entertorminescence element in response to the light emission

rustroction; and

reverse bias application means for applying a voltage to

the serial circuit of said organic electroluminescence element for said capacitive element in the direction contrary to the forward polarity direction of said organic electroluminescence element does not

emit light.

8. A light emitting circuit according to claim 7, further comprising light emission maintaining means for maintaining a potential difference between both ends of the serial circuit potential difference between poth and said organic electroluminescence element and said

anbby of the draving current by said draving current capacitive electroluminescence element and said

supplying means.

9. A light emitting circuit according to claim 7, wherein said driving current supplying means includes a current source for supplying the driving current to one end of said diode leaves to a side enposite to said connection point for a element on a side enposite to said connection point for a

element on a side opposite to said connection point for a

instruction, and first switching means for supplying a

reference potential to one end of said organic electroluminescence element on a side opposite to the connection point when the driving a first potential, which is higher than the reference potential, to the one end of said organic electroluminescence element when the driving current is not supplied by said current source, and

switching means, after finishing the supply of the driving current by said current source, for supplying the first potential to one end of said ospecitive element on a side opposite to said connection point, and thereafter, supplying the reference potential to the one end of said capacitive element during a period when said organic electroluminescence element does not emit light.

said reverse bias application means includes second

10. A light emitting circuit for making an organic electroluminescence element emit light in response to a light emission instruction, comprising:

a diode element connected with said organic

series;

a capacitive element connected with said organic electroluminescence element at the connection point of said organic electroluminescence element and said diode element; the connection point of said organic electroluminescence element at the connection point of said organic elements.

potential, which is higher than a reference potential, to one end of said organic electroluminescence element on a side

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obbosite to the connection point;

quinting current supplying means for supplying a driving

carrent in the forward direction to said capacitive element

furongh said diode element in response to the light emission

jusfraction; and

second potential application means for applying the first

potential to one end of said capacitive element on a side

of the driving current by said driving current supplying obbostie to said connection point, after finishing the supply

ceffs respectively including organic electroluminescence s display panel in which a plurality of light emitting II. A display device comprising:

elements are arranged in a matrix shape;

sarq Trdyt emitting cells in accordance with input image data; Jeast one Light emitting cell to be driven to emit Light of Tight emitting cell specifying means for specifying a

driving means for making an organic electroluminescence gug

being in the light emitting cell specified by said light element emit light, said organic electroluminescence element

emitting cell specifying means,

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connected with said organic electroluminescence element in a wherein said light emitting cell includes a diode element

forward polarity direction in series, and

said organic electroluminescence element and said diode a capacitive element connected at the connection point of

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element, and

emit light.

said driving means includes driving current supplying to said organic electroluminescence element and said capacitive electroluminescence element in response to capacitive element through said diode element in response to

the serial circuit of said organic electroluminescence element or said capacitive element in the direction contrary to the forward polarity direction of said organic electroluminescence element when said organic electroluminescence element does not

reverse bias application means for applying a voltage to

12. A display device according to claim ii, wherein said light emitting cell specifying means specifies a light emitting cell to be driven emit light by sequentially scanning

a plurality of lines of said display panel. 13. A display device comprising:

e display panel in which a plurality of light emitting

elements are arranged in a matrix shape;

Light emitting cell specifying means for specifying a

sud light emitting cells in accordance with input image data;

being in the light said organic electroluminescence element emit light, said organic electroluminescence element

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said light emitting cell includes a diode element emrffrud cell specifying means,

connection point,

pue

forward polarity direction in series, and counsected with said organic electroluminescence element in a

s capacitive element connected with said organic

organic electroluminescence element and said diode element, ejectroluminescence element at the connection point of said

means for applying a first potential, which is higher than a said driving means includes first potential application

reference potential, to one end of said organic

ejectroluminescence element on a side opposite to the

content in the forward direction to said capacitive element granting current supplying means for supplying a driving

second potential application means for applying the first fustruction, and through said diode element in response to the light emission

ot the driving current by said driving current supplying obbosice to said connection point, after finishing the supply Doceuttal to one end of said capacitive element on a side

a plurality of lines of said display panel. ewiffing cell to be driven emit light by sequentially scanning Tight emitting cell specifying means specifies a light 14. A display device according to claim 11, wherein said .sasem

FIG. 1

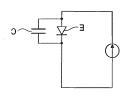


FIG. 2

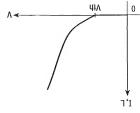


FIG. 3

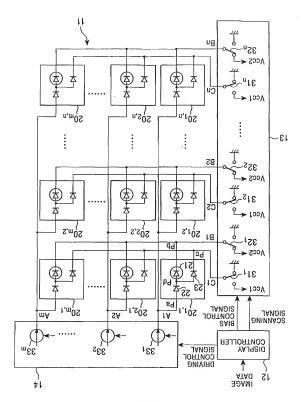


FIG. 4

REVERSE BIAS APPLICATION MODE 0V Vcc2 01	CONTINUOUS MODE OV Vcc2 Vo	NON- LIGHT OV OV	LIGHT ABOUT 10V 0V VO	OPERATING MODE POTENTIAL Pa POTENTIAL Pb POTENTIAL Pc POTENTIAL Pd
Vcc2 0V	Vcc2 Vcc1	0V Vcc1	0V Vcc1	ENTIAL Pb POTENTIAL Pc
۷0	Vcc2 + 5V	ABOUT 3V	ABOUT 7V	POTENTIAL Pd

HIG. 9

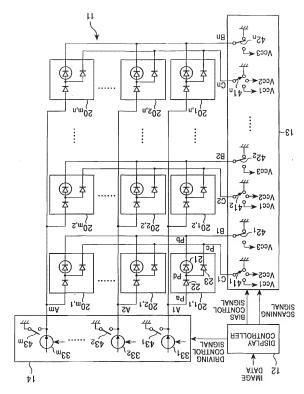


FIG. 6

	REVERSE APPLICAT	CONTINUOUS MODE CONTINUOUS MODE REVERSE BIAS APPLICATION MODE		SCANNING MODE	
	BIAS ON MODE	Ä	EMISSION LIGHT NON-	LIGHT	OPERATING MODE
	CURRENT SOURCE 33 ₁ : INACTIVE SWITCH 43 ₁ : ON	STATE CORRESPONDING TO ANOTHER SCANNING LINE	CURRENT SOURCE 331: INACTIVE SWITCH 431: ON	CURRENT SOURCE 33 ₁ : ACTIVE SWITCH 43 ₁ : OFF	OPERATING STATE
	0V	0V	0V	10V	POTENTIAL Pa
	Vcc3	Vcc3	۷0	0V	POTENTIAL Pb
	VO	Vcc1	Vcc2	Vcc2	POTENTIAL PA POTENTIAL Pb POTENTIAL Pc POTENTIAL Pd
	Vf	Vcc3 + 5V	ABOUT 3V	ABOUT 7V	POTENTIAL Pd
/3	ьC.				

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FIG. 7

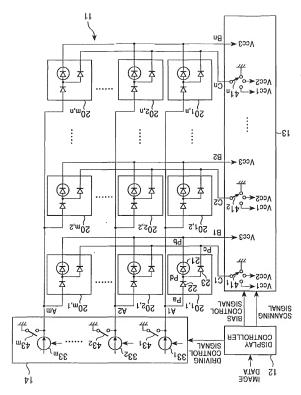
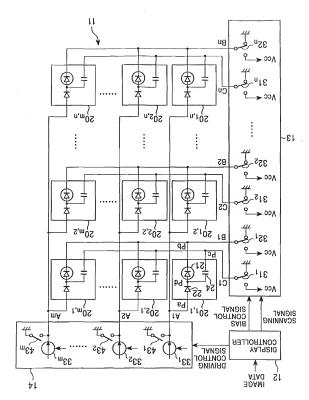


FIG. 8

\$		0V	Vcc3	07	SWITCH 431: ON	APPLICATION MODE
					CURRENT SOURCE 33: INACTIVE	EVERSE BIAS
Vcc3 + Vα	Vc	Vcc1	Vcc3	0V	STATE CORRESPONDING TO ANOTHER SCANNING LINE	LIGHT EMISSION CONTINUOUS MODE
$Vcc3 + V\alpha - V\gamma$ $(V\alpha = 3V)$	Vcc3 (V	Vcc2	Vcc3	0V	CURRENT SOURCE 331: INACTIVE SWITCH 431: ON	MODE NON- LIGHT EMISSION
	Vcc3 (V	Vcc2	Vcc3	ABOUT 10V	CURRENT SOURCE 33 ₁ : ACTIVE SWITCH 43 ₁ : OFF	LIGHT
ENTIAL Pd	POTE	POTENTIAL Pc	POTENTIAL Pa POTENTIAL Pb POTENTIAL Pc POTENTIAL Pd	POTENTIAL Pa	OPERATING STATE	OPERATING MODE

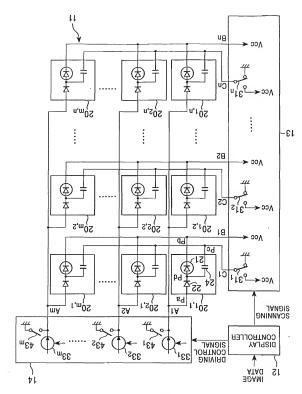
FIG. 9



-lG. 10

- Vcc + Vβ	0V	Vcc	0V	CURRENT SOURCE 331: INACTIVE SWITCH 431: ON	REVERSE BIAS APPLICATION MODE
Vcc + Vα	Vcc	Vcc	VO	STATE CORRESPONDING TO ANOTHER SCANNING LINE	CONTINUOUS MODE
ABOUT 3V	0V	0V	VO	CURRENT SOURCE 331: INACTIVE SWITCH 431: ON	MODE NON- LIGHT EMISSION
ABOUT 7V	VO	۷0	ABOUT 10V	CURRENT SOURCE 33 ₁ : ACTIVE SWITCH 43 ₁ : OFF	LIGHT EMISSION
POTENTIAL Pd	POTENTIAL Po	POTENTIAL Pa POTENTIAL Pb POTENTIAL Pc POTENTIAL Pd	POTENTIAL Pa	OPERATING STATE	OPERATING MODE

FIG. 11



MODE	LIGHT	MODE	Š G	
NON- LIGHT EMISSION	LIGHT	NON- LIGHT EMISSION	EMISSION	OPERATING MODE
LINE	STATE CORRESPONDING	CURRENT SOURCE 331: INACTIVE SWITCH 431: ON	CURRENT SOURCE 331: ACTIVE SWITCH 431: OFF	OPERATING STATE
0V	۷0	. 0V	ABOUT 10V	POTENTIAL Pa
Vcc	Vcc	Vcc	Vcc	POTENTIAL Pb
۷۷	Vcc	۷0	۷V	POTENTIAL Pa POTENTIAL Pb POTENTIAL Pc POTENTIAL Pd
3V + Vcc	7V + Vcc ~ 3V + Vcc	ABOUT 3V + Vcc	ABOUT 7V + Vcc	POTENTIAL Pd

PCT/3P03/00626 **†EES90/E0 OM**

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